

A NEW SPECIES OF SCALE-WORM, *HARMOTHOE COMMENSALIS* (POLYCHAETA: POLYNOIDAE), FROM MANTLE CAVITIES OF TWO CHILEAN CLAMS

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Abstract.—A new species of polynoid, *Harmothoe commensalis*, is described from the mantle cavities of two subtidal clams, *Gari solida* and *Semele solida*, on the Chilean coast. About 50% of the clams investigated at Bahía La Herradura, Coquimbo, contained single individuals of the new polynoid. This is the third documented record of commensal association between polynoid polychaetes and bivalve molluscs.

Many polychaetes live in association with other animals. Polynoids, particularly, are commensals on or with numerous invertebrates, such as sponges, cnidarians, molluscs, echinoderms, and other polychaetes (Pettibone 1953). Clark (1956) compiled a list of commensal polychaetes and their respective hosts that included thirty species from the Polynoidae and twenty species from other families. None of the polynoid species he mentioned had been found living in association with lamellibranch molluscs.

Commensal polynoid polychaetes have been recorded from bivalve molluscs on two previous occasions. Pettibone (1984) described *Branchipolynoe symmytilida*, from mantle cavities of giant deep-sea mussels, *Bathymodiolus thermophilus* Kenk & Wilson, 1985, at 2500 m in the Galapagos Rift vent area. A second species, *B. seepensis*, was also described by Pettibone (1986), from mantle cavities of mussels in the abyssal eastern Gulf of Mexico, near hypersaline seep-sites.

During dissection of specimens of the subtidal clams *Gari solida* (Gray, 1828) and *Semele solida* (Gray, 1828) collected from Bahía La Herradura, at Coquimbo, polychaetes were found living in the mantle cavities (Fig. 1). Examination of the commensal revealed it to be an undescribed species of Polynoidae that we describe here as *Har-*

mothoe commensalis, new species. This is the third record of commensalism between a polynoid and bivalve molluscs and is the first case reported from the Chilean south-east Pacific (Rozbaczylo 1985).

Type specimens are deposited in the National Museum of Natural History, Smithsonian Institution, Washington, D.C. (USNM); Sala de Sistemática, Departamento de Ecología, Pontificia Universidad Católica de Chile, Santiago (SSUC); and in the personal reference collections of both authors.

Materials and Methods

Clams were collected by diving at Bahía La Herradura, Coquimbo, Chile, at 9 and 12 m depth from four 1 m² × 0.3 m deep samples in the north-west sector of the bay, at two sites characterized by different sediment granulometry composition of the sediments. Ninety-four bivalves (16 *S. solida* and 78 *G. solida*) were collected and examined. Additionally, seven specimens of *G. solida* and three of *S. solida* were bought from fishermen at a cove in Tomé, Bahía de Concepción, who said the clams had been collected between 10 and 15 m depth, near Tomé. To select type specimens of the polynoids, additional clams were collected at 10 m depth at Bahía La Herradura, Coquimbo, on 24 Jan 1991. Scanning electron micro-

scopic (SEM) observations and photographs were executed by the first author with a JEOL JSM-25SII. Figures were prepared by means of a drawing tube on a Wild M-5 microscope.

Harmothoe commensalis, new species
Figs. 1–4

Material examined.—Central Chile: Bahía La Herradura, Coquimbo, 29°58'S, 71°22'W, 10 m, J. I. Cañete, coll., from *G. solida* and *S. solida*, 24 Jan 1991, holotype (USNM 157690), 4 paratypes (USNM 157691), and 2 specimens (SSUC 6700); Bahía La Herradura, from *G. solida*, 10–20 m, J. I. Cañete, coll., Dec 1986, 2 specimens; Bahía La Herradura, from *S. solida*, 10–15 m, J. I. Cañete, coll., 2 specimens. Tomé, Bahía de Concepción, 36°37'S, 72°57'W, from *S. solida*, 10–15 m, 20 Mar 1989, 1 specimen (SSUC 6701).

Description.—Length of adults 14–18 mm, width 3.5–4.2 mm, excluding setae, with 37–40 segments; body nearly linear, tapering slightly anteriorly and posteriorly (Fig. 2); oval in cross section. Elytra with two pigmented zones of olivaceous to brownish color: larger medial and smaller lateral zones with colorless areas between, giving appearance of a “heart” on each elytron, and continuous with colorless periphery (Fig. 3A, B). Body flesh-colored in live specimens, but changing according to sexual state of maturity. Elytra 15 pairs arranged on elytophores of segments 2, 4, 5, 7, alternate segments to 23, 26, 29, and 32. Specimens under 10 mm in length with 14 pairs of elytra; these strongly imbricated, completely covering dorsum, except for last 5–6 segments. Elytra variable in shape and size along body, becoming larger posteriorly; first pair of elytra circular, covering prostomium, following two pairs subreniform; and rest oval in shape. Elytral surface smooth with a few scattered microscopic tubercles (Fig. 3A); second and third pairs of elytra with small group of microtubercles near anterior curves of elytra (Figs. 3B, C, 4a–c); margins smooth,

lacking papillae. Elytophores large, bulbous. Dorsal cirri and dorsal tubercles on non-elytrigerous segments; dorsal tubercles conspicuous, nodular. Dorsal cirri with globose cirrophores pigmented on anterior and posterior sides; styles fusiform, not extending beyond tips of setae, pigmented in the lower half of its length, and covered with small pyriform papillae. Prostomium (Figs. 3A, 4a) of light tan color, bilobed, slightly wider than long, with convex lateral margins; with well developed cephalic peaks, diverging laterally from median antenna; median groove extending about half length of prostomium. Median antenna long, papillated, inserted on a large conspicuous ovoid ceratophore in anterior notch; lateral antennae inserted ventrally on small ceratophores; styles short, basally globose, distally filiform, slightly pigmented and with small pyriform papillae. Palps up to twice length of prostomium, wider basally, tapering distally to short digitiform tips; with short papillae arranged in close-set longitudinal rows. Two pairs of black eyes in trapezoidal arrangement, anterior pair slightly larger located on lateral margin of middle of prostomium, posterior pair smaller displaced medially. First segment with tentaculophores lateral to prostomium, each with dorsal and ventral tentacular cirri similar to median antenna, with internal acicula and single curved notoseta on medial side. Second segment with first pair of large elytophores lateral to posterior half of prostomium, biramous parapodia and long ventral buccal cirri, similar to tentacular cirri, on neuropodia lateral to ventral mouth. Anterior end of evaginated pharynx with 18 triangular papillae, nine dorsally and nine ventrally and two pairs of pointed jaws of golden to brown color; invaginated pharynx extending up to segment 11. Parapodia biramous (Fig. 3D, E). Notopodium rounded lobe on anterodorsal face of neuropodium, extending into acicular lobe from which acicula projects; slightly pigmented on anterior and posterior sides. Notosetae amber



Fig. 1. Specimen of clam *Gari solida* photographed immediately after dissection showing *Harmothoe commensalis*, new species, "in situ."

colored, numerous (30–35), forming radiating bundle of four or five rows, increasing in length from dorsal to ventral rows (Fig. 4d), longest notosetae not extending beyond tips of neuropodium. Notosetae slightly stouter than neurosetae, slightly curved, with unidentate blunt tips, with 33–34 transverse rows of spines (Figs. 3F, 4e). Neuropodial presetal aciculcar lobe diagonally truncate distally, with short stout digitiform supraacicular process; neuroacicula only slightly stouter than notoacicula; postsetal lobe shorter, more or less rounded. Neurosetae amber-colored, from seven to nine supraacicular and 39–40 subacicular. All neurosetae similar (Fig. 4d); supraacicular ones longer, with 13–15 rows of spines; subacicular ones shorter, decreasing in length from dorsal to ventral, bearing 9–13 rows of spines (Figs. 3G, 4f); all neurosetae with bidentate tips. Ventral cirri short, located at mid-length of neuropodia; styles basally globose and distally pointed; cirrophores and ventral cirri slightly pigmented, covered with very short scattered papillae.

Pygidium small, with pair of long anal cirri, about as long as four or five posterior segments, with pigmented basal zones, and distally tapered, covered with small papillae.

Geographical distribution.—Known only from the type locality and Bahía de Concepción, Chile.

The clams are distributed from Callao, Perú to Archipiélago de los Chonos, Chile (Osorio et al. 1979), therefore the geographical distribution for *H. commensalis* could vary as other localities are investigated.

Taxonomical remarks.—The genus *Harmothoe* now contains in excess of 150 species (Hanley, pers. comm.). Many of these species are poorly described and illustrated and their distributions are poorly known. As a consequence, it is difficult to adequately define the basis for new species in this genus. However, in this case, the unusual habit of commensalism with bivalve molluscs, the lack of evidence of free-living individuals, and the lack of ornamentation on the elytra (unusual in the genus, but often

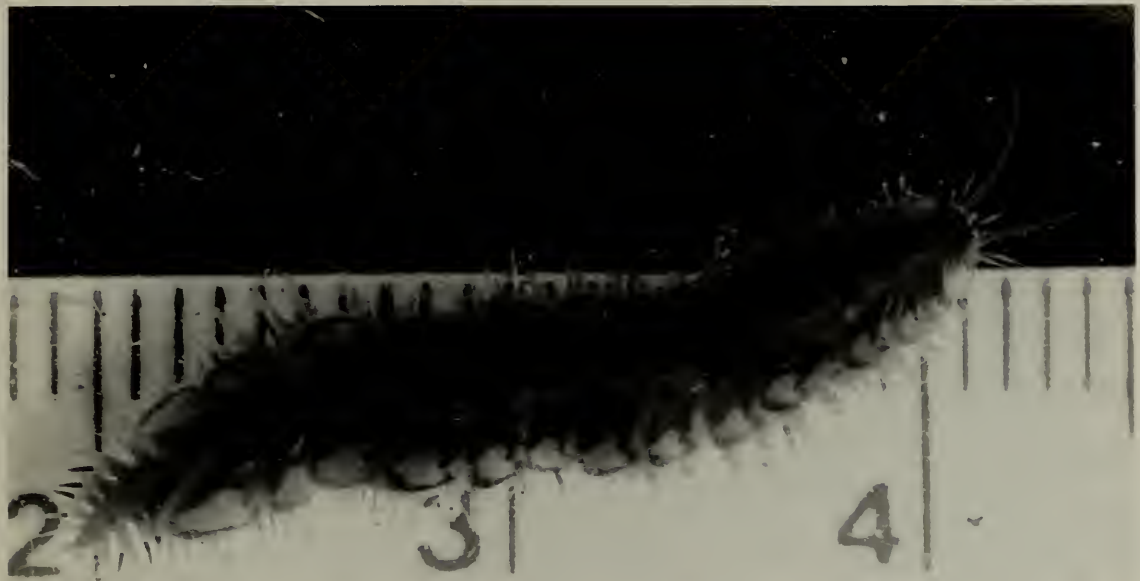


Fig. 2. *Harmothoe commensalis*, new species, photographed alive after removal from the mantle cavity of the clam *Gari solida*.

typical of commensals) provide strong grounds for the erection of a new species. Among the species of *Harmothoe* previously described from Chilean and subantarctic waters, only *H. brevipalpa* Bergström, 1916, is morphologically similar to the new species but can be distinguished from it by the following characters. The elytral surface of *H. brevipalpa* is uniformly covered with conical, blunt microtubercles, except on the anterior and inner borders, while the elytral surface of *H. commensalis* has groups of microtubercles near the anterior curves of the elytra (Figs. 3B, 4b, c), the rest of the surfaces being almost smooth. In *H. brevipalpa*, the posterior elytral borders have fringes of club-shaped papillae, while in *H. commensalis* the elytral borders lack papillae. In *H. brevipalpa*, the dorsal cirri are covered with papillae and the ventral cirri are smooth, while in *H. commensalis* both the dorsal and ventral cirri have papillae, although less numerous in the ventral ones. Also, the neuropodial acicular lobe of *H. commensalis* is less developed than in *H. brevipalpa*; and the numbers of notosetae (30–35) and neurosetae (46–49) are higher

in *H. commensalis*, as compared to *H. brevipalpa*: notosetae (15–20) and neurosetae (30–35).

Etymology. — The name *commensalis* refers to the biological relationship between the new species and the clams.

Ecological remarks. — In each of the four areas sampled, 22% to 78% of the clams contained a single commensal polynoid. The only case of more than one commensal per clam was two juvenile scaleworms. *H. commensalis* was not found free-living, suggesting it is an obligate commensal. In *G. solida*, 13 commensals were females (34%), 19 were males (50%) and in six cases the sex could not be determined due to the absence of gametes. In live animals, females were recognized by their reddish color, while males were cream-colored on the ventral surface. The lengths of the polychaetes ranged from 8.7 to 29.2 mm. There was no correlation between the lengths of the polynoids and the clams; for instance, the largest clam (*G. solida*), at 82.4 mm long, contained a polynoid of only 13.5 mm in length. Polynoids were not found in clams less than 60 mm long, although samples included small-

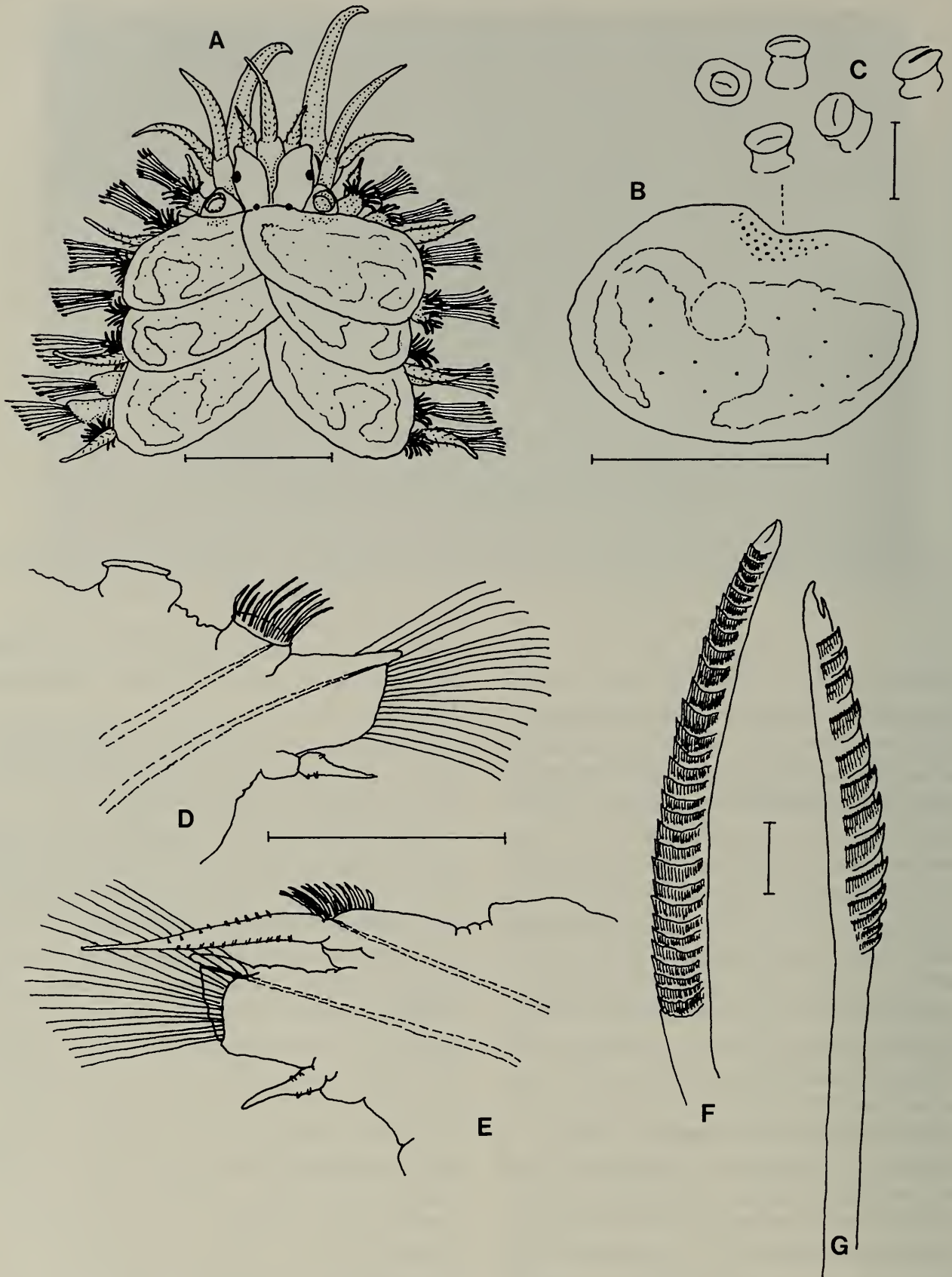


Fig. 3. *Harmothoe commensalis*, new species (USNM 157691). A, anterior end in dorsal view; B, second left elytron; C, detail of microtubercles from anterior curved part of elytron; D, left elytrigerous parapodium, anterior view, acicula dotted; E, left cirriferous parapodium, posterior view, acicula dotted; F, notoseta from parapodium 7; G, subacicular neuroseta, from parapodium 7. Scales = 1 mm for A, B, D, E; 0.02 mm for C, F, G.



Fig. 4. *Harmothoe commensalis*, new species, SEM micrographs: a, dorsal view of anterior end showing third pair of elytra, median and lateral antennae and tentacular cirri missing; b, left 3rd elytron showing microtubercles on anterior part; c, detail of microtubercles from anterior part of same; d, notosetae and neurosetae from anterior region of body; e, detail of notosetae; f, detail of neurosetae. Scales = 1 mm for a; 0.1 mm for b-f.

er clams. Other bivalve species of comparable size inhabiting the same area were also examined. The intertidal *Protothaca taca* (Molina, 1782) and the subtidal *Ensis macha* (Molina, 1782), and *Tagelus dombeii* (Lamarck, 1818), were all without commensal polynoids.

The presence of the polynoid has no apparent negative effect on the tissues of the clams. We do not know if the scale-worm shares the clams' food particles or whether it feeds on pseudofeces accumulated in the mantle cavity of the bivalves. Thus, *H. commensalis* may be considered a commensal, as defined by Cheng (1967), because it derives physical shelter from the host, and is nourished on foods that are associated but are not a part of the host.

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